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ABSTRACT

Focusing on the library book borrowing behavior which can be controlled by the circulation policy of the library, this study investigates such factors as type of borrower, type of material borrowed, number of items borrowed, and length of time borrowed, and ascertains the effects these factors have on the use of borrowed library materials. Data gathered from a survey of borrowers from the Fort Worth (Texas) Public Library conducted in the autumn of 1976 and the spring of 1977 are used to test four hypotheses: (1) that a greater amount of efficient use occurs among books borrowed by non-multiple borrowers, (2) that more efficient use occurs among books held less than the mean borrowing time, (3) that higher use efficiency occurs among books borrowed for non-school purposes, and (4) that greater use efficiency occurs among fiction books than among non-fiction books. Study procedures, including data collection methods, data tabulation, and statistical tests used in data evaluation, are presented along with summaries of questionnaire data and statistical findings. Sample questionnaires and a bibliography are also provided. (FM)

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MEASURING THE EFFICIENCY OF USE OF BOOKS BORROWED FROM A PUBLIC LIBRARY

Presented to the Graduate Council of the
North Texas State University in Partial
Fulfillment of the Requirements

For the Degree of

MASTER OF LIBRARY SCIENCE

By

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May, 1979

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

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CHAPTER I

PURPOSE, PROBLEM, AND BACKGROUND

Introduction and Overview

The problem of improving use of and access to library materials is a many faceted one; the present study concerns itself only with those aspects of this problem involving the extent to which borrowers use or fail to use borrowed library materials. More specifically, the study deals with that borrower behavior which can be controlled by the circulation policy of the library. The study investigates such factors as type of borrower, type of material borrowed, number of items borrowed, and length of time borrowed. It attempts to find out if these factors affect the efficiency of use of borrowed library materials.

This associational study utilizes data gathered from a survey of borrowers from the Fort Worth Public Library. The survey was conducted in two phases during the autumn of 1976 and the spring of 1977. The findings of the study indicate that efficient use of materials is positively related to the type of borrower, type of material (non-fiction versus fiction), and length of loan period.

Background and Related Studies

A major concern of public libraries is making limited library resources optimally accessible to users. For this purpose libraries often purchase multiple copies of those materials most in demand. Two factors tend to limit the use of this strategy; namely, additional costs and additional shelving requirements.

The library's circulation policy constitutes another variable which must be considered as a factor influencing the extent of usage of library resources. If users retain library materials beyond the time of their actual use, other would-be users of these materials are denied access to them. Additionally, if users check out more items than they can use within a given loan period, the unused materials do not serve the needs of either the actual borrower or the potential borrower. Such behavior constitutes inefficient use of library materials and it may prevent optimal use of a library's collections and resources (8).

Diminished accessibility and efficiency of use due to excessive borrowing may be alleviated through circulation control measures. Such control measures can also help minimize library materials being retained by borrowers beyond the time of their actual utilization by the borrowers. Typically, these controls consist of adjustments in the loan

period and limitations on the number of items which each borrower is permitted to check out.

Possibly due to the technical difficulties of obtaining data on the extent of use of borrowed library materials relatively little attention has been paid to this aspect of the problem (47, p. 39).

The prevalence, especially in public libraries, of manual circulation systems which can not readily provide for variable loan periods and limiting the number of loans has been another inhibiting factor to the improvement of access (17, p. 1). The advent of computerized circulation systems, however, has made it possible not only to collect data on the usage of library materials, but also to implement loan periods of flexible length (17, p. 1).

In a 1975 study at the University of Lancaster in England, Buckland investigated key variables related to library circulation policies, borrower demand, and book availability (accessibility). Buckland found that availability varies inversely with demand and with loan period (8, p. 58). He also noted that "this (the impact of borrowing on the availability of books) appears to be the most important problem area in the control of a library's book stock . . ." (8, p. 5).

Data from his study suggest that the length of the loan period may influence the use efficiency of some

materials. He stated that the analysis of data "show quite clearly that there is a marked tendency for borrowed books to be returned (or renewed) when they are due back and that this pattern is strongly marked regardless of the length of the official loan period, the status of the borrower, or the subject matter of the books borrowed." (8, p. 79). Burkhalter and Race reached substantially the same conclusion in a 1968 study in an American academic library (9,p.27).

With reference to high demand materials, Buckland concluded that a more restrictive loan period resulted in greater accessibility and increased circulation at the University of Lancaster Library (8, p. 139). Yagello and Guthrie also obtained increased circulation with a reduced loan period at an American academic library (45).

Although Buckland was concerned primarily with the effect of loan period upon accessibility, he recognized the possibility that excessive borrowing could have an adverse effect upon accessibility and that control of the number of items borrowed is a possible remedy (8, p. 86). He indicated, however, that adequate control over the number of items borrowed requires a computerized circulation system (8, p. 86).

A 1948 study by Dick and Berelson (28) investigated the extent of use of books borrowed from a public library. This investigation was limited in scope and did not attempt

to correlate the extent of use of borrowed books with accessibility, or with length of loan period, number of books borrowed, or type of borrower. The authors found that only ten per cent of the fiction books and forty-one per cent of the non-fiction books borrowed were read less than half-way (28, p. 104).

Goldhor conducted a borrower usage study in 1970 for two public libraries in Illinois (30). The purpose of the study was to determine whether circulation could be increased by displaying a group of books in a prime location for browsing. One of the questions of the study concerned the degree of usage of the book by the borrower. Levels of use were categorized as none, less than half, more than half, and all.

Goldhor's purpose in asking about usage was to determine if any increased circulation among the selected books was accompanied by decreased usage of the books. He found that with circulation non-fiction tended to be less completely read than fiction. However, he did not attempt to correlate extent of usage with other book and borrower characteristics, nor did he address the question of whether usage, circulation, and accessibility could be affected by circulation policy.

Hamburg et al (31) have developed a method of measuring library materials usage known as "document exposure time."

This method requires questioning users as to the amount of time they spent reading the materials they checked out (or used in the library). There are serious problems with the Hamburg method, however, which made it impractical for application in the present study. De Prospo points out that the Hamburg methodology "is based on the questionable assumption that people who return books can accurately remember how much time they spent reading each title . . . No attempt was made to find out whether circulated books were read completely, partially, or not at all." (10,p.9).

Another possible measure of library materials usage, originally suggested by Meier (38) is that of "item-use days." With this method, the borrower is asked to indicate the number of days he actually used the item(s) borrowed. This measure has the same defect as that of exposure time, the fallibility of the borrower's memory as to the actual number of days of use.

The Fort Worth Public Library system (setting of the present study)(hereafter referred to as FWPL) is typical of many large urban public library systems of the United States. The FWPL system encompasses a large central library (the book collection of which exceeds three hundred thousand volumes), seven branch libraries, and an extension facility operating four bookmobiles. The manual circulation system

controls materials in excess of one and one-half million items checked-out per year. Current loan policy at FWPL allows a three week loan period on all borrowed materials with no limit on the number of items which may be borrowed, nor limitation on renewals. For overdue materials, a fine of five cents per-day-per-item is imposed. The fine may not, however, exceed half the replacement cost of the overdue item.

In January, 1965, the loan period at FWPL was reduced from four weeks to three. This reduction, according to members of the FWPL staff, was made in order to increase circulation and to bring FWPL into conformity with the loan period recommended by an American Library Association study of circulation systems (11, p. 86). In view of the lack of an empirically derived rationale for setting the current FWPL circulation policy, this study attempts to provide information about actual usage requirements which may warrant the formulation of a revised circulation policy at FWPL which will tend to maximize user access to library materials.

Problem and Hypotheses of the Present Study

The objective of the present study is to investigate the efficiency of use of borrowed books in the FWPL system and to identify whether use efficiency is associated with

multiple borrowing, with the length of the loan period, with type of borrower, or with kind of book borrowed. If use efficiency is found to be influenced by one or more of these factors it may be possible for FWPL to reflect this fact in circulation policy adjustments to increase accessibility.

Actual hypotheses tested in the present study include the following:

Hypothesis 1.-- A significantly greater amount of efficient use occurs among those books borrowed by non-multiple borrowers than among those of multiple borrowers.

Hypothesis 2.-- A significantly greater amount of efficient use occurs among those books held less than the mean borrowing time than among those held longer than the mean borrowing time (prolonged retention).

Hypothesis 3.-- A significantly greater amount of efficient use occurs among those books borrowed for non-school purposes than among those borrowed for school purposes.

Hypothesis 4.-- A significantly greater amount of efficient use occurs among fiction books than among non-fiction.

Abbreviations and Definitions of Terms

The following definitions are used throughout this study:

Efficiency of use.-- With reference to borrowed library books, this term describes a continuum of possibilities for

extent of use of the books over time. Thus, a book is efficiently used if it is quickly returned to the library after its use is complete. Similarly, a book is inefficiently used if its return is delayed unreasonably beyond its actual use.

Excessive borrowing.-- The borrowing of more library books than will be used during the prescribed loan period. This term includes not only those books which are not read or examined at all, but also those books which may be examined only to the extent necessary to determine that they are unsuitable for the purpose for which they were borrowed (an activity which could have been done at the library)

Level-of-use.-- The proportion of a library book read or examined as indicated by a user after the book has been borrowed on the bookmark questionnaire and as quantified supra.

Materials.-- For the purposes of this study, library books only.

Multiple borrowers.-- Borrowers of more library books than the mean for all borrowers as determined by this study. Multiple borrowers may be excessive borrowers if they make little or no use of some of those materials borrowed.

Prolonged retention.-- The holding of a borrowed book longer than the mean number of days of the sampling group as a whole.

Use efficiency index.-- A measurement of the efficiency of use of a borrowed book. The index is calculated using the formula E=DL, where E is the use efficiency index, D is the number of days a book is borrowed, and L is the level of use of a book as indicated by the borrower on the bookmark questionnaire (question 5). The level of use is quantified according to the following system: read whole book = 1; more than half = 2; less than half = 3; just a few pages = 4; none = 5.

The objective is to combine two interval components into a composite index. The two factors, length of loan (D) and level-of-use (L), are not additive because addition is related generally to accumulation. The index elements included in the study lend themselves to a product because a product describes the inclusiveness of the set of objects obtained by combining "A" sets, each of which contain "B" objects (or combining "B" sets, each of which contain "A" objects; . . AB = BA). Furthermore, components of an index must logically reflect that which they are to measure and represent one dimension. Length of time a book is charged out is one reflection of use and proportion of book read is another, therefore, the index dimension is the efficiency of use of the materials.

Scope and Limitations of the Study

Use efficiency of borrowed materials is but one aspect of the multi-faceted problem of accessibility of library materials. A 1977 study of accessibility in an academic library by Saracevic (41) examined library malfunction (e.g. misshelving), user failure to locate shelved books, and theft as factors contributing to lack of accessibility. An over-long loan period and excessive borrowing, although only two of many possible reasons for less efficient use of borrowed materials, appear to be among the relevant, yet neglected, variates of those which have been studied.

As can be seen in the structured questionnaire (Appendix Ia) discrete borrower characteristics are examined in order to establish possible influences on the efficient use of materials.

Differences between the Central Library and the Southwest Branch with reference to types of materials borrowed and extent of materials used are analyzed. Such differences may require differing loan policies between these libraries. In addition, actual book retention time data were obtained from the transaction slips of the books borrowed on those days when the questionnaires were administered.

Basic Assumptions

The present study takes as assumptions applicable to public libraries the finding of Buckland in his studies of an English academic library that accessibility varies inversely with borrower demand and with loan period. It is also assumed that inefficient use of borrowed library materials (including delayed return of borrowed materials after completion of usage) decreases overall accessibility to library materials. A further assumption is made that the formula, E=DL, for measuring efficient use of borrowed materials is adequate and meaningful for that purpose.

CHAPTER II

PROCEDURES

This chapter describes the procedures followed in the collection of data used to test the hypotheses stated in Chapter I. This description is divided among three main topics: 1) the data collection process; 2) the tabulation of the data from the questionnaire; 3) the statistical tests used to evaluate the data.

The Data Collection Process

The collection of data relevant to testing the hypotheses of the study involved designing of the data collection instrument (the questionnaire), pre-testing it for validity, and administering it to FWPL borrowers.

Design of the Questionnaire

Because the present study was a part of a larger study of FWPL borrowers, the questionnaire was designed to obtain more data than were actually needed for the more limited purposes of the smaller study. The questionnaire is composed of two physical parts: 1) an 8 1/2 inch by 14 inch large form and 2) a smaller bookmark form. The bookmark form sought data concerning each specific book borrowed (one bookmark form per book). It is the data gathered from the

bookmark forms with which the present study is primarily concerned. Facsimilies of these instruments can be seen in Appendix Ia, Fort Worth Public Library Borrower Survey and Appendix Ib, The Bookmark.

The study utilized the subject-completed questionnaire method of data gathering because it was not feasible, due to lack of sufficient staff, to utilize a structured interview technique.

Pre-Testing the Questionnaire

In order to determine whether the questionnaire was designed to elicit successfully the desired data, it was pre-tested by distribution of copies to twenty-five FWPL borrowers. Because of time limitations, the pre-testing procedure did not allow the borrowers to take the questionnaires home to be returned with the books days or weeks later. Instead, they were asked to complete the questionnaires in the library and return them immediately. This procedure revealed minor difficulties borrowers experienced in completing the questionnaires. These difficulties were subsequently corrected.

Administration of the Questionnaires

The design of the study required that the questionnaires be administered to borrowers during two time periods;

five weeks in September and October of 1976 and a second five weeks in March and April of 1977. The purpose of two separate samplings was to insure that any seasonal variations in borrowing behavior could be taken into account. Accordingly, the questionnaires were distributed to borrowers at the Central Library and the seven branches on Monday, September 20, 1976; Tuesday, September 28; Wednesday, October 6; Thursday, October 14; Friday, October 22; and Saturday, October 30.

The questionnaires were distributed in the following manner. The check-out clerks were instructed to select randomly anyone of the first borrowers to enter the library and to hand out the questionnaires to each fifth borrower thereafter throughout the time the library was open that day.

After a selected borrower was checked by rolladex to determine that he was an eligible borrower, he was handed the questionnaire with an attached explanatory letter. Each of the questionnaires was numbered sequentially and coded with an identifier for each library in the FWPL system. Thus, it could be established how many questionnaires were distributed each day and on which day and from which agency any particular questionnaire was handed out. A copy of the explanatory letter can be seen in Appendix Ic. There

was also a sign placed on the check-out desk stating, "The Library is conducting a survey of borrowers today. Questionnaires will be placed in some borrower's books during check-out. If you receive one, please take it home and fill it out. You will be helping us find out how to serve you better."

As each of the selected borrower's books was checked out, one of the small bookmark forms was placed in it, protruding so as to be easily seen. The patron could thus use the small form as a bookmark while reading the book and have it at hand to fill out when use of the book was completed.

The selected borrowers were instructed by the letter to fill out the questionnaire at their leisure and to complete each bookmark questionnaire in the books. All the bookmark questionnaires were to be attached securely to the large questionnaire and were to be returned when the last book was returned. Every effort was made through the instructions and the structure of the study to have the selected borrowers behave during the study as they ordinarily would in their use and return of the borrowed books.

Upon return of the questionnaires, the circulation clerks were instructed to inspect them to insure the small forms were securely attached to the large forms.

The Spring 1977 sampling period consisted of questionnaire distribution on Monday, February 28; Tuesday, March 8; Wednesday, March 16; Thursday, March 24; Friday, April 1; and Saturday, April 9. The procedure was changed somewhat in order to correct a problem which had become apparent in the first distribution period. The respondents had sometimes failed to indicate the return date on the bookmark questionnaires. Furthermore, the percentage of returned questionnaires was lower than desired.

This procedural change required distributing the questionnaires as the borrowers returned the books and asking them to complete the forms in the Library. Both the borrowing and return date could thus be established because the borrowing date could be deduced from the transaction slip in the book. Moreover, because the questionnaires were completed in the Library, the return rate was much higher than before.

Data Tabulation

After each distribution period the returned forms were grouped by library and examined for completeness. Responses to all questions were hand-tallied. Summary data about the questionnaires themselves were also tallied and calculated. These data included number and percentage of questionnaires distributed and returned, total circulation during the

sample period, sampled books as percent of total circulation, distribution of books borrowed per borrower, distribution of sampled books by number of days borrowed, and mean number of days books were borrowed. These data are presented in Chapter III (Table I).

Statistical Tests Used to Evaluate the Data

In order to test the hypotheses of the study utilizing the data derived from the questionnaires, two standard statistical tests were selected. The Chi Square Test with Yate's Correction was employed to determine whether an association could be said to exist between the use efficiency index calculated for the borrowed books and the four variables selected as the most likely to be associated with inefficient use; study related borrowing, non-fiction borrowing, multiple borrowing, and prolonged retention of the borrowed books.

The Chi Square Test was performed utilizing a 2x2 table which dichotomized each of the variates as well as the criterion variable. Use of the 2x2 configuration was desirable for the sake of simplicity and for avoiding empty cells in a larger configuration.

For those Chi Square results indicating the existence of association between inefficient use and one of the variates, the degree of association Phi (ø) (6, p. 230)

was calculated.

The second test used on the data from the questionnaire was the t-test of independent samples. For the purposes of the t-test, the level of data use was converted from a nominal scale (read less than one half versus read more than one half) to an interval scale. This conversion was accomplished by assigning a number from one to five to each of the possible responses for portion of the book read, and by calculating the index as described supra.

The means of the use efficiency index numbers were used in the t-tests to determine whether the dichotomized variates (multiple versus non-multiple borrowing, non-fiction versus fiction, study borrowing versus non-study borrowing, and prolonged retention versus non-prolonged retention) could be said to be significantly different (i.e., come from different populations) as regards use efficiency. The 0.05 level of significance was adopted for both the Chi Square and the t-tests. The results of the statistical tests are presented in Chapter III.

CHAPTER III

PRESENTATION OF FINDINGS

This chapter presents in tabular form that data relevant to the hypotheses of this study derived from the completed questionnaires. Also presented are the findings resulting from application of statistical tools to the data from the questionnaires.

Summary of the Questionnaire Data

This section displays only that data from the questionnaires which are relevant to the hypotheses under consideration. A summarization of all data obtained from the questionnaire responses is shown in Appendix II.

In each table, the data are arranged by sampling group population (i.e. Central Library, Fall 1976; Southwest Branch, Fall 1976; Central Library, Spring 1977; and Southwest Branch, Spring 1977).

Total Defined Population

Table I presents those data which define the population of the study. Returned questionnaires were considered usable for the study only if completed bookmark forms were returned with the large questionnaire. In some instances the

bookmark form responses were not complete for one or more data elements. For that reason, in some of the tabular presentations to follow, the totals will not equal the overall totals for the populations.

Multiple Borrowing Data

Data relevant to the first hypothesis are contained in Table II. The number of borrowers is defined by the number of large questionnaires; the number of books borrowed is equal to the number of bookmark forms attached to the large forms.

The mean number of books borrowed in each population is the number above which a borrower is considered a multiple borrower for the purposes of the first hypothesis.

The data in this table indicate that borrowers from the Central Library tend to borrow fewer books each than borrowers from the Branch.

Prolonged Retention Data

Data relevant to the second hypothesis are contained in Table III. An upper limit of 31 days was placed on book retention to prevent a few books with extremely long retention times from skewing the data toward the high end. A book returned the same day borrowed is considered to have been retained one day.

Borrowers from the Branch tend to retain books longer than those who borrow from Central. It may also be pertinent that the retention time increased for both agencies between the Fall and Spring sampling periods.

School Related Borrowing

Data relevant to the third hypothesis are contained in Table IV. Book borrowing is dichotomized between school related borrowing and borrowing for all other purposes.

School related borrowing constitutes a higher percentage of total borrowing at Central than at the Branch, though non-school borrowing predominates at both agencies.

Type of Book Borrowed

Data relevant to the fourth hypothesis are contained in Table V. Here borrowing is dichotomized between fiction and non-fiction books.

It is apparent from this table that the Central Library differs substantially from the branch in the type of books borrowed; non-fiction being predominant for the former, fiction for the latter.

Level of Use Data

Data relevant to all four hypotheses are contained in Table VI. This table summarizes the borrowers' responses regarding the portion of the book they actually read or

examined. The assumption underlying this question is that the borrower can more accurately estimate the portion of the book read than the amount of time spent with the book.

A rather peculiar pattern indicated by the table is that a higher percentage of branch borrowers read the whole book than did Central borrowers but a higher percentage of Central borrowers read more than half the book than did branch borrowers.

Use Efficiency Index Data

Table VII presents the use efficiency index scores for the dichotomies for each of the four hypotheses of the study. It also gives a score for all books surveyed in each of the populations. To recapitulate the explanation in Chapter I, these scores are obtained for each book by multiplying the level of use number (one for whole book read through five for none read) by the number of days each book was retained. The scores given in Table VII are the mean scores for each data grouping. Each score given in Table VII quantifies the efficiency of use of the books in each data grouping. The higher the score the less efficient the use.

This table reveals several findings of importance derived from the survey data. The mean use efficiency among all books surveyed in each population is higher in the branch than at Central. Fiction was more efficiently used than non-fiction both at the branch and at Central. Books borrowed for school

related purposes were less efficiently used than those borrowed for non-school purposes at Central, but at the branch this relationship was reversed. There was little difference in efficiency of use as between multiple and non-multiple borrowers from both branch and Central. Use efficiency of books retained beyond the mean time was substantially less than that of books retained less than mean time at both branch and Central.

Summary of Tabular Data

The following tables present in concentrated form the data from the survey which are relevant for the hypotheses examined by this study. These data indicate the existence of substantial differences between the branch and the Central Library as regards several types of book use.

TABLE I

TOTAL DEFINED POPULATION

Population	Total Questionnaires Distributed	Number of Questionnaires Returned	Total Unusable Returns	% of Total Dist.	Total Usable Returns	% of Total Dist.
Central Fall 1976	338	122	48	14.2	74	21.9
Southwest Branch Fall 1976	251	128	13	5.2	115	45.8
Central Spring 1977	246	186	22	8.9	164	66.6
Southwest Branch Spring 1977	57	31	5	8.8	26	45.6
Total	892	467	88	9.9	379	42.5

TABLE II

NUMBER OF BOOKS BORROWED

Population	Total Borrowers From Usable Returns	Total Books Borrowed	Mean Number of Books Per Borrower
Central Fall 1976	74	183	2.5
Southwest Branch Fall 1976	115	346	3.0
Central Spring 1977	164	374	2.3
Southwest Branch Spring 1977	26	113	4.3
Total	379	1,016	2.7

TABLE III

BOOK RETENTION DATA

Population	No. of Borrowed Books With Retention Data	Total Days Books Were Retained	Mean Days of Book Retention
Central Fall 1976	148	2,345	15.8
Southwest Branch Fall 1976	313	5,177	16.5
Central Spring 1977	279	5,257	18.8
Southwest Branch Spring 1977	110	2,100	19.1
Total	850	14,879	17.5

TABLE IV

PURPOSE OF BORROWING

Population	No. Borrowed for School Related Reading	% of Total Borrowed	No. Borrowed for All Other Purposes	% of Total Borrowed
Central Fall 1976	25	13.7	157	85.7
Southwest Branch Fall 1976	12	5.3	333	96.2
Central Spring 1977	82	21.9	292	78.1
Southwest Branch Spring 1977	18	15.9	95	84.1
Total	137	13.5	877	86.5

TABLE V

TYPE OF BOOK BORROWED

Population	No.of Non-Fiction Books Borrowed	% of Total Borrowed	No.of Fiction Books Borrowed	% of Total Borrowed
Central Fall 1976	135	73.8	46	25.1
Southwest Branch Fall 1976	146	42.2	200	57.8
Central Spring 1977	269	71.9	102	27.3
Southwest Branch Spring 1977	50	44.2	63	55.8
Total	600	59.3	411	40.7

TABLE VI

LEVEL OF USE

Population	Read Whole Book	Read More Than Half	Read Less Than Half	Read Only Few Pages	Read None	Total
Central Fall 1976	101 (55.8%)	32 (17.7%)	15 (8.3%)	31 (17.1%)	2 (1.1%)	181 (100%)
Southwest Branch Fall 1976	210 (60.7%)	30 (8.7%)	45 (13.0%)	47 (13.6%)	14 (4.0%)	346 (100%)
Central Spring 1977	183 (49.3%)	69 (18.6%)	69 (18.6%)	38 (10.2%)	12 (3.2%)	371 (99.9%)
Southwest Branch Spring 1977	90 (79.7%)	12 (10.6%)	7 (6.2%)	4 (3.5%)	0 (0%)	113 (100%)
Total	584	143	136	120	28	1,011

TABLE VII

USE EFFICIENCY INDEX SCORES

Population	Fiction/ Non-Fiction	School/ Non-School Borrowing	Multiple/ Non-Multiple Borrowing	Retained Beyond/ Less Than Mean Time	All Books Surveyed
Central Fall 1976	22.6/35.3	51.4/29.3	31.6/33.1	44.1/18.8	32.3
Southwest Branch Fall 1976	27.6/35.5	17.2/31.6	30.6/31.7	38.5/22.6	31.1
Central Spring 1977	24.3/43.9	56.5/33.8	39.2/38.0	48.8/23.9	38.5
Southwest Branch Spring 1977	26.5/26.6	19.4/27.9	25.2/29.3	33.4/7.4	26.5

Summary of the Statistical Findings

This section presents the findings from the application of the Chi Square test and t-test to the data for each of the four hypotheses. The Chi Square tests for each hypothesis are considered, then the t-tests.

The Chi Square Tests

This section gives the results of the Chi Square tests of the four hypotheses of the study. Each hypothesis was tested for the four populations. The 0.05 level was chosen as the threshold of significance. In those instances where the test indicates a significant correlation, the strength of the correlation is measured by the phi (ϕ) calculation.

The Multiple Borrowing Hypothesis - -

Table VIII presents the results of the Chi Square tests as applied to the data for the first hypothesis. Only for the Central Spring population did the Chi Square test indicate a significant association between multiple borrowing and inefficiency of use.

The Prolonged Retention Hypothesis - -

Table IX presents the results of the Chi Square tests as applied to the data for the second hypothesis. None of the four populations tested indicated a significant association between prolonged retention and use inefficiency.

The School Related Borrowing Hypothesis - -

Table X presents the results of the Chi Square tests as applied to the third hypothesis. Two and possibly three of the four populations tested indicated significant associations between school related borrowing and inefficient use of borrowed books. The association in the Central, fall and Central, spring populations was significant at the 0.001 level.

The Non-Fiction Related Borrowing Hypothesis - -

Table XI presents the results of the Chi Square tests as applied to the fourth hypothesis. Three of the four populations (all except Southwest Branch, Spring) indicate significant association between non-fiction borrowing and inefficient use of the borrowed books. The ϕ calculation for these populations also indicates this association to be the strongest among the variates considered.

TABLE VIII

CHI SQUARE TESTS FOR ASSOCIATION
BETWEEN USE EFFICIENCY AND MULTIPLE BORROWING

Central, Fall 1976

Mean = 2.5 borrowed	Read 1/2+	Read 1/2-
4+ borrowed	81	22
3- borrowed	52	26

x^2 = 2.34; not significant at the 0.05 level

Central, Spring 1977

Mean = 2.3 borrowed	Read 1/2+	Read 1/2-
3+ borrowed	141	86
2- borrowed	109	33

x^2 = 8.18; significant at the 0.01 level

ϕ = 0.15

Southwest Branch, Fall 1976

Mean = 3.0 borrowed	Read 1/2+	Read 1/2-
4+ borrowed	141	59
3- borrowed	99	47

x^2 = 0.13; not significant at the 0.05 level

Southwest Branch, Spring 1977

Mean = 4.3 borrowed	Read 1/2+	Read 1/2-
5+ borrowed	70	5
4- borrowed	32	6

x^2 = 0.98; not significant at the 0.05 level

TABLE IX

CHI SQUARE TESTS FOR ASSOCIATION BETWEEN USE EFFICIENCY AND PROLONGED RETENTION

Central, Fall 1976

Mean Retention - 15.8 days	Read 1/2+	Read 1/2-
Held 17+ days	52	25
Held 16- days	48	21

x^2 = 0.03; not significant at the 0.05 level

Central, Spring 1977

Mean Retention = 18.8 days	Read 1/2+	Read 1/2-
Held 20+ days	110	52
Held 19- days	77	37

x^2 = 0.00; not significant at the 0.05 level

Southwest Branch, Fall 1976

Mean Retention = 16.5 days	Read 1/2+	Read 1/2-
Held 18+ days	121	45
Held 17- days	97	50

x^2 = 1.23; not significant at the 0.05 level

Southwest Branch, Spring 1977

Mean Retention = 19.1 days	Read 1/2+	Read 1/2-
Held 20+ days	71	10
Held 19- days	28	1

x^2 = 1.15; not significant at the 0.05 level

TABLE X

CHI SQUARE TESTS FOR ASSOCIATION BETWEEN USE EFFICIENCY AND SCHOOL RELATED BORROWING

Central, Fall 1976

	Read 1/2+	Read 1/2-
School related	10	15
Non-School related	121	33

x^2 = 13.04; significant at the 0.001 level.

ϕ = 0.27

Central, Spring 1977

	Read 1/2+	Read 1/2-
School related	40	39
Non-School related	210	80

x^2 = 13.54; significant at the 0.001 level

ϕ = 0.19

Southwest Branch, Fall 1976

	Read 1/2+	Read 1/2-
School related	3	9
Non-School related	237	97

x^2 = 7.88; possibly significant at the 0.01 level but uncertain because one of the expected cell frequencies is less than 5.

Southwest Branch, Spring 1977

	Read 1/2+	Read 1/2-
School related	18	0
Non-School related	84	11

x^2 = 1.55; not significant at the 0.05 level

TABLE XI

CHI SQUARE TESTS FOR ASSOCIATION BETWEEN USE EFFICIENCY AND NON-FICTION BORROWING

Central, Fall 1976

	Read 1/2+	Read 1/2-
Non-Fiction	87	46
Fiction	44	2

x^2 = 13.61; significant at the 0.001 level

ϕ = 0.28

Central, Spring 1977

	Read 1/2+	Read 1/2-
Non-Fiction	160	107
Fiction	92	10

x^2 = 29.03; significant at the 0.001 level

ϕ = 0.28

Southwest Branch, Fall 1976

	Read 1/2+	Read 1/2-
Non-Fiction	79	67
Fiction	161	39

x^2 = 25.76; significant at the 0.001 level

ϕ = 0.27

Southwest Branch, Spring 1977

	Read 1/2+	Read 1/2-
Non-Fiction	44	6
Fiction	58	5

x^2 = 0.102; not significant at the 0.05 level

The t-Tests

This section presents the results of the t-test of independent samples as applied to the four hypotheses of the study. As with the Chi Square tests, each hypothesis was tested for each of the four populations studied. The 0.05 level was chosen as that necessary for significance.

Each table among the t-tests presents the dichotomized variate tested, the number of books involved (N), the mean use efficiency index scores for the books (X), the standard deviation (s), and the t score.

The Multiple Borrowing Hypothesis - -

Table XII presents the results of the t-tests as applied to the data for the first hypothesis. No significant association between multiple borrowing and inefficiency of use was indicated for any of the four populations.

The Prolonged Retention Hypothesis - -

Table XIII presents the results of the t-tests as applied to the second hypothesis. Here, a significant association between prolonged retention and inefficient use of borrowed books was indicated for all four populations. Furthermore, significance was at the 0.01 level for all four populations.

The School Related Borrowing Hypothesis - -

Table XIV presents the results of the t-tests as applied to the third hypothesis. A significant association (at the 0.01 level) between school related borrowing and inefficient usage was found for two of the populations: Central Fall and Central Spring.

The Non-Fiction Related Borrowing Hypothesis - -

Table XV presents the results of the t-tests as applied to the fourth hypothesis. A significant association was found between non-fiction borrowing and inefficient use of borrowed books for three of the four populations (all except Southwest Branch, Spring). Two were significant at the 0.01 level and one (Central, Fall) at the 0.02 level.

Summary of Statistical Test Findings

The first hypothesis, that there is an association between multiple borrowing and inefficient use of borrowed books, could not be confirmed by either the Chi Square or the t-test.

The second hypothesis, that there is an association between prolonged retention of borrowed books and their inefficient use could not be confirmed by the Chi Square test but was strongly confirmed (all four populations indicating a significant association at the 0.01 level) by the t-test.

The third hypothesis, that there is an association between school related borrowing and inefficient use of the borrowed books, as confirmed by both tests for the two Central Library populations, but by neither test for the two Southwest Branch populations.

The fourth hypothesis, that there is a significant association between non-fiction borrowing and inefficient use of borrowed books, was confirmed by both tests for three of the populations: Central, fall; Central, spring; and Southwest Branch, fall.

TABLE XII

t-TESTS FOR ASSOCIATION BETWEEN USE EFFICIENCY AND MULTIPLE BORROWING

Central, Fall 1976

Mean = 2.5 Borrowed	N	$\bar{X}$	s	t
4+ borrowed	78	31.6	27	0.33
3- borrowed	68	33.1		

Central, Spring 1977

Mean = 2.3 Borrowed	N	$\bar{X}$	s	t
3+ borrowed	116	38.8	28.3	0.21
2- borrowed	161	38.1		

Southwest Branch, Fall 1976

Mean = 3.0 Borrowed	N	$\bar{X}$	s	t
4+ borrowed	75	25.2	20	1.00
3- borrowed	35	29.3		

Southwest Branch, Spring 1977

Mean = 4.3 Borrowed	N	$\bar{X}$	s	t
5+ borrowed	75	25.2	20	1.00
4- borrowed	35	29.3		

TABLE XIII

t-TESTS FOR ASSOCIATION BETWEEN USE EFFICIENCY AND PROLONGED RETENTION

Central, Fall 1976

Mean retention was 15.8 days	N	$\bar{X}$	s	t
Prolonged retention (17+ days)	78	44.1	23.9	6.37*
Non-Prolonged retention (16- days)	68	18.8		

Central, Spring 1977

Mean retention was 18.8 days	N	$\bar{X}$	s	t
Prolonged retention (20+ days)	162	48.8	25.7	7.88*
Non-Prolonged retention (19- days)	115	23.9		

Southwest Branch, Fall 1976

Mean retention was 16.5 days	N	$\bar{X}$	s	t
Prolonged retention (18+ days)	167	38.5	23.3	5.97*
Non-Prolonged retention (17- days)	146	22.6		

Southwest Branch, Spring 1977

Mean retention was 19.1 days	N	$\bar{X}$	s	t
Prolonged retention (20+ days)	81	33.4	16.4	7.39*
Non-Prolonged retention (19- days)	29	7.4		

* Significant at the 0.01 level.

TABLE XIV

t-TESTS FOR ASSOCIATION BETWEEN USE EFFICIENCY AND SCHOOL RELATED BORROWING

Central, Fall 1976

	N	$\bar{X}$	s	t
School related	20	51.4	27.8	3.31*
Non-School related	126	29.3		

Central, Spring 1977

	N	$\bar{X}$	s	t
School related	57	56.5	26.8	5.73*
Non-School related	220	33.8		

Southwest Branch, Fall 1976

	N	$\bar{X}$	s	t
School related	11	17.2	24.5	1.91
Non-School related	302	31.6		

Southwest Branch, Spring 1977

	N	$\bar{X}$	s	t
School related	18	19.4	20	1.64
Non-School related	92	27.9		

* Significant at the 0.01 level.

TABLE XV

t-TESTS FOR ASSOCIATION BETWEEN USE EFFICIENCY AND NON-FICTION BORROWING

Central, Fall 1976

	N	X̄	s	t
Non-fiction	112	35.3	26.5	2.46#
Fiction	34	22.6		

Central, Spring 1977

	N	X̄	s	t
Non-fiction	200	43.9	27.1	5.57*
Fiction	77	24.3		

Southwest Branch, Fall 1976

	N	X̄	s	t
Non-fiction	138	35.5	24.2	2.84*
Fiction	175	27.6		

Southwest Branch, Spring 1977

	N	X̄	s	t
Non-fiction	62	26.6	20	0.03
Fiction	48	26.5		

Significant at the 0.02 level
* Significant at the 0.01 level

CHAPTER IV

RESEARCH PROBLEM AND HYPOTHESES

This study has attempted to investigate the efficiency-of-use of the books borrowed from the Fort Worth Public Library. Moreover, it has sought to determine whether use efficiency is correlated with discrete borrower or book type factors. If such factors are associated with significant inefficiency-of-use, it may be possible, through the flexibility inherent in an automated circulation system, to control those factors in such a way as to increase the efficiency-of-use, and, by extension, user accessibility to the book collection.

In order to examine the problem of inefficient-use and its possible causes and effects, the following hypotheses were considered: (1) that a significantly greater amount of efficient use occurs among those books borrowed by non-multiple borrowers than among those of multiple borrowers; (2) that a significantly greater amount of efficient use occurs among those books held less than the mean borrowing time than among those held beyond the mean borrowing time; (3) that a significantly greater amount of efficient use occurs among those books borrowed for non-school purposes than among those borrowed for school purposes; and (4) that

a significantly greater amount of efficient use occurs among fiction books than among non-fiction.

Summary of Major Findings

This section summarizes the major findings of the study as regards the four stated hypotheses under consideration. Preliminary to those findings, however, is a discussion of the use efficiency index as the method for measuring efficiency-of-use and for testing the hypotheses.

Measuring Use Efficiency

The first question to be considered by the study in analysing the data from the questionnaire responses was whether a significant degree of inefficient-use exists among the books borrowed from the Fort Worth Public Library. The term "significant" here is meant in a non-statistical sense because there are no objective criteria against which any discovered degree of inefficient-use may be compared. However, since any degree of inefficient-use can be said to decrease accessibility, even the smallest degree of inefficient-use may be considered significant. Most probably the significance of a measured degree of use should be determined emperically by discovering the minimum to which inefficient-use can be decreased by circulation policy without causing circulation to decrease.

Because there are no existing criteria for significance of measured efficiency-of-use, the measured inefficiency obtained from the present study can be considered significant until proved otherwise.

The method of measuring efficiency-of-use, the Use Efficiency Index, provides some assistance in the subjective judging of the significance of measured inefficiency. Based on a combination of actual borrowing time and borrower rated level of use, the Index presents a continuum of possible scores from one to one hundred sixty. The higher the score, the greater the inefficiency. Any particular score can thus be evaluated as better or worse than any other score as regards efficiency-of-use. Furthermore, each score can be, to an extent, evaluated on the basis of the overall possibilities available from the Index.

For example, a score of 22 can be seen to represent a book which was read completely (use level rating of one) and retained for 22 days (the entire three week loan period). Of course, the same score could refer to a book used more than half (use level rating of two) and retained only eleven days. Thus, there is always some ambiguity involved in the index for any single book for which we do not know the exact combination of use level and retention time. But is the ambiguity of any real importance? If we can say the index represents a certain degree of inefficiency regardless

of the combination of use and retention which brought about the score, the ambiguity becomes irrelevant. This implies the equivalence of all possible combinations of use rating and retention time for any given score. For an index of sixty, for example, could we say that the use efficiency resulting from reading the whole book and retaining sixty days is equal to that of reading less than half and a retention of twenty days as well as no usage and retention for 12 days? Subjective judgment is again the only approach.

The same reasoning which applies to the use efficiency index for a single book can be applied to a group of books although the possibilities for variation among individual scores must be recognized and taken into account when discussing composite scores. The composite score will be more meaningful the less the variability among the individual scores.

A second factor which must be taken into account when interpreting the meaningfulness of a composite score is the percentage of circulation represented by the sub-group being studied. A high index for a group representing only a small fraction of the total circulation may not be significant as far as policy making is concerned. On the other hand, elimination of inefficient-use among even a small fraction of the circulation would improve accessibility to

some degree. Furthermore, an increase in accessibility may cause an increase in circulation; that is, inefficient-use may be an important contributing cause of low circulation.

In summary, this study proceeds from the position that any measured degree of inefficient-use may be significant. Its ultimate significance will depend upon identifying the reasons for the inefficient-use.

Buckland (8, p. 6) concluded that for high-demand materials a more restrictive loan period resulted in greater accessibility and increased circulation in academic libraries. In public libraries, however, a too short loan period may result in detering some people from using the library, thus violating the library's raison d'etre.

Obviously there must be compromise between increasing accessibility through circulation policy and providing for borrower convenience. An analysis of the type and degree of use efficiency of borrowed books (as well as monitoring circulation) should enable the library to better determine whether the borrower is being allowed a sufficient or excessive loan period for a particular type of book.

Buckland's findings establish a theoretical basis for improving accessibility; a use efficiency analysis provides a method of measurement for determining more precisely what loan period to impose on what materials in order to optimize accessibility for a particular library.

Analysis of the Mean Use Efficiency Index Scores

Table VII presents the use efficiency index scores for the various dichotomized sub-groups of books corresponding to the stated hypotheses. It also gives the total use efficiency scores for each of the four populations used in the present study. These total scores represent the mean use efficiency existing among all books circulated by the FWPL during the time periods under consideration. The scores changed noticeably for each library from one sampling period to the next. Central registered a mean total use efficiency of 32.3 during the Fall 1976 period and 38.5 for the Spring 1977 period. The scores for the Southwest Branch moved in the opposite direction; from 31.1 in the Fall 1976 period to 26.5 in the Spring 1977 period.

Without comparison data from other libraries or other sampling periods for these libraries, it is impossible to determine whether these changes in total use efficiency are meaningful. They may represent a normal seasonal fluctuation resulting from different types of uses during different times of the year. On the other hand, the fluctuation may be simply a normal range of variation representing no meaningful change in magnitude.

The primary finding to be noted in this section is

that all of the total use efficiency scores represent what would appear to be a considerable degree of inefficient-use. Each of the scores is above that for a book (or group of books) read fully and retained the entire loan period (a score of 22).

The use efficiency scores for the dichotomized sub-groups displayed in Table VII are indicative of the factors associated with a high degree of inefficiency. This table was predictive of the t-test results. Where the table indicated a large differential between mean use efficiency scores for dichotomized variables, the t-tests indicated the differences were significant.

The Multiple Borrowing Hypothesis

The first hypothesis proposed that a significantly greater degree of use efficiency occurs among those books borrowed by non-multiple borrowers than among multiple borrowers. This hypothesis could not be varified by either the Chi Square or the t-tests. In fact, the mean use efficiency scores for non-multiple borrowing were slightly higher than those for multiple borrowing in three of the four populations. This proved insignificant in the t-tests.

Although there would seem to be little difference in the mean use efficiency of books borrowed by multiple and non-multiple borrowers, it may be worthy of note that the

inefficiency-of-use for both sub-groups was not insignificant, approximating the overall mean non-use in both groups. This is to say, the negative results of the tests do not mean that multiple borrowers are conscientious borrowers, but rather that the high degree of inefficient use among multiple borrowers is not much different from that among those who borrow few books at a time.

The Prolonged Retention Hypothesis

The second hypothesis proposed that a significantly greater efficiency-of-use occurs among those books held less than the mean borrowing time than among those held beyond the mean borrowing time. This hypothesis could not be confirmed by the Chi Square tests for any of the populations. The t-tests, however, tended to affirm the hypothesis for all four populations.

The differing results from the two types of tests suggests that as regards the two constituents of use efficiency, retention time and level of use, retention time is the major factor at least as far as this particular variate is concerned. This would seem to be only logical since the basis of the dichotomy is mean retention time but that is not a necessary conclusion. If, for instance, retention time were not a widely disbursed varible and a much lesser degree of use occurred among those books retained less than

mean time, an inverse relationship might well have occurred between use efficiency and retention time.

The School Usage Hypothesis

The third hypothesis proposed that a significantly greater efficiency-of-use occurs among those books borrowed for non-school purposes than among those borrowed for school purposes.

This hypothesis was confirmed for the two Central sampling groups by both the Chi Square and the t-tests. Phi (ϕ) was moderate at 0.28 and 0.19. The two Southwest Branch populations however, tended to disaffirm the hypothesis in both the Chi Square and t-tests.

These results would seem to indicate a difference between the Central Library and the Southwest Branch in the way study related materials are used by borrowers. In examining the questionnaire responses for possible explanation of these differences it is apparent that the Central Library is different from the branch both in the types of users and the types of books borrowed (Central has higher percentages of students and of school related borrowing; travel time to Central is longer; more non-fiction is borrowed from Central) but it would be difficult to assign the difference in school related usage to any of these factors without more extensive analysis than is possible in the

present study.

The Non-Fiction Hypothesis

The fourth hypothesis proposed that a significantly greater efficiency-of-use occurs among fiction borrowing than among non-fiction. The Chi Square tests tended to affirm the hypothesis for all the populations except the Southwest Branch Spring group. Significance for the three affirming groups was at the 0.001 level. The phi calculation measuring the strength of the association was low (0.28 and 0.27) but not negligible.

The results of the Chi Square tests, then, suggest that non-fiction is moderately associated with a lower degree of usage (less efficient usage) than is fiction.

The t-tests, too, indicated positive association between inefficient-use and non-fiction in all populations except the Southwest Spring group. Significance for the three affirming groups was at the 0.02 and 0.01 levels.

Limitations of the Present Study

Possible threats to the internal and external validity of the study are discussed in this section.

Internal Validity

The associational nature of the research design for the present study makes it more susceptible to internal

invalidity than a truly experimental design. An experimental design, however, was precluded by the characteristics of much of the required data. That the study necessitated collection of data by means of a subject-administered questionnaire creates even greater uncertainty. It is therefore important to enumerate the possible threats to the internal validity of the study. The classes of extraneous variables as described by Huck, Cormier, and Bounds (12, pp. 234-238) will be employed to structure the discussion.

History.-- There were no historical effects because no subsequent measurements were made pertaining to the original data. Although there were two sampling periods, this was not a pre-test/post-test design.

Maturation.-- There were no effects due to maturation since the two sampling periods did not involve the same individuals.

Testing.-- Although there was no subsequent testing of the same subjects, some of the data elements were reactive measures. Thus, the sampled group may have acted differently because they were participating in the survey than they would under ordinary circumstances. This is especially the case with the two components of use efficiency: level of use and retention time. Although the respondents were requested to behave no differently during the survey than they otherwise would, there is the possibility that they

acted in a non-usual manner. There is no evidence, however, of any such non-usual behavior.

In order to test for unusual book retention behavior among the two fall population groups, the distribution of retention times for all circulation during the sampling period was compared to that of the two sample groups. The sample groups' retention times were found to correspond closely to those for the borrower population as a whole.

Because the spring sampling was performed as borrowers returned books, there was no problem of testing effects as far as book return behavior is concerned.

Instrumentation.-- Although the sampling instrument, the questionnaire, was administered differently during the spring sampling period than in the fall, there should be no effects of instrumentation since the study was not of the pre-test/post-test type. Each population group stands on its own, not relying on comparison with the others for validity.

Statistical Regression.-- There are no regression effects since the pre-test/post-test design is not involved.

Mortality.-- There should be no mortality effects since the questionnaires were distributed at random for each sampling group. The study was not dependent upon retaining the same subjects from one sampling period to the next.

External Validity

Possible sources of external invalidity were also investigated, again using the discussions in Huck, Cormier, and Bounds (12, pp. 258-267) as a basis:

Experimentally accessible population versus target population.-- The target population was that which was tested and there was random assignment of subjects.

Multiple-Treatment Interference.-- Although the method of obtaining borrower information was changed for the second survey period, this did not really constitute a change in treatment. Furthermore, because the groups surveyed were not the same borrowers each time, there should not be any effects of the change.

Pre-test and Post-test Sensitization.-- The study did not utilize pre-test/post-test methodology, nor were the sample groups the same individuals during the two sample periods.

Experimenter or Rosenthal Effect.-- The possibility of experimenter effects is negligible since the questionnaires were self-administered with no interposition of an interviewer.

Competing Hypotheses

The present study did not exhaust the possible hypotheses which might be constructed to account for inefficient-

use of borrowed library books. Indeed, it is probable that there are other factors which are related to use efficiency and it is possible that some are more strongly associated with inefficient use than those investigated here. It should be kept in mind, however, that the variables investigated here were chosen because they could be controlled with an automated circulation system if a positive association were discovered.

Of course, because this was an associational rather than an experimental study, no causal relationships were indicated. It may be, therefore, that the relationships obtained were secondary or dependent effects. Subsequent studies may also show that those relationships demonstrated in the present study are more properly combinatorial relationships; i.e., that the variates studied here may have stronger relationships with inefficient use if combined with each other or with other variates not treated in the present study.

Relationship of Findings to Previous Studies

The pioneering work of Buckland in England provided the impetus for the present study. He showed that accessibility could be improved by control of the loan period and (probably) of the number of books borrowed per borrower.

The hypothesis associating inefficient-use with non-

fiction borrowing was derived from the studies done by Dick and Berelson and by Goldhor.

Statement of Major Conclusions

The present study provided the following major conclusions:

(1) Inefficient-use of borrowed books (as measured by the Use Efficiency Index) is positively associated with the length of time the books are retained by the borrower.

(2) Inefficient-use of borrowed books (as measured by the Use Efficiency Index) is positively associated with books borrowed for school purposes.

(3) Inefficient-use of borrowed books (as measured by the Use Efficiency Index) is positively associated with non-fiction books.

(4) Inefficient-use of borrowed books (as measured by the Use Efficiency Index) appears not to be associated with the number of books borrowed per borrower.

Changes Resulting From the Study

It was decided by the Fort Worth Public Library Administration to utilize the findings of the present study as a basis for circulation policy when the automated circulation system becomes operational.

Recommendations for Further Study

The focus of investigation of the present study (the improvement of accessibility through the reduction of inefficient-use) would appear to be a fertile and relatively little-touched area. The conclusions of the present study should be tested in other public libraries both by associational and experimental studies.

Hypotheses used in the present study require more thorough investigation than was possible here. Both additional variates associated with use efficiency and the possible combination of those variates used here should be adduced.

The Use Efficiency Index as a method for measuring non-use should be applied to other libraries in order to accumulate a body of data which would allow comparative evaluation of use efficiency of borrowed books among libraries. The Use Efficiency Index can provide useful comparative data despite varying loan periods because it should be possible to translate a score from one library to another by the direct proportion method.

APPENDIX Ia

FORT WORTH PUBLIC LIBRARY BORROWER SURVEY

1. SEX: Male ____ Female ____

2. ARE YOU: Married ____ Single ____

3. NUMBER OF PERSONS IN HOUSEHOLD:
(A) Adults ____
(B) Children (under 15) ____

4. WHAT IS YOUR AGE IN YEARS? ____

5. RACE: Black ____ White ____ Mexican-American ____ Other (please specify) ____

6. HIGHEST LEVEL OF EDUCATION YOU HAVE ATTAINED:
6th Grade or Less ____
7th - 12th Grade ____
High School Graduate ____
1-4 years College ____
College Graduate ____
Post Graduate ____

7. ARE YOU CURRENTLY A STUDENT (EITHER FULL OR PART-TIME)?
Yes ____
No ____

8. WHAT IS THE APPROXIMATE ANNUAL INCOME OF YOUR FAMILY? ____

9. OCCUPATION: (A) In what type of business, industry, or service is your company or employer engaged? (Please be specific: for example, steel manufacturing, education, textile wholesale, state government, etc.) If you do not work for an employer, please give your occupation or profession (or indicate if presently unemployed or retired):

____

(B) What is your title or position? (For example, machine operator, sales manager, partner, letter carrier, doctor, housewife, etc.) ____

10. WHERE DO YOU LIVE?
(A) In Fort Worth: East ____ North ____ NE ____ Downtown ____ South ____ SE ____ SW ____ West ____
(B) Outside Fort Worth, but in Tarrant County ____
(C) Outside Tarrant County ____

11. WHAT LIBRARY DO YOU USUALLY USE? (A) Fort Worth Public Libraries:
Downtown ____ East Branch ____ North Branch ____ Northeast Branch ____ Southwest Branch ____ Southeast Branch ____ South Branch ____ West Branch ____ Bookmobile ____

(B) Non-Fort Worth Public Libraries (please specify) ____

12. HOW DO YOU USUALLY GET TO THAT LIBRARY?
Family car ____ Other car ____ Bus ____ Walk ____ Other ____

13. DO YOU USUALLY GO TO THAT LIBRARY FROM:
Home ____ Work ____ School ____ Other (specify) ____

14. HOW LONG DOES IT USUALLY TAKE YOU TO GET TO THAT LIBRARY?
Less than 5 minutes ____
5 - 15 minutes ____
16 - 30 minutes ____
31 - 45 minutes ____
46 - 60 minutes ____
Over one hour ____

15. HOW OFTEN DO YOU VISIT A LIBRARY?
Everyday ____
Several days a week ____
Once a week ____
Several days a month ____
Every 3 weeks ____
Several days a year ____
Once a year or less ____
Other (specify) ____

16. HOW DID YOU FIND THE BOOKS YOU BORROWED ON YOUR LAST VISIT (WHEN YOU GOT THIS FORM)?
Used card catalog ____
Asked a librarian ____
Other (please specify) ____
Knew where to look on shelves ____
Just browsed ____

17. ON YOUR LAST VISIT, DID YOU FIND THE SPECIFIC BOOK(S) YOU WANTED?
Yes ____
No, book(s) I wanted was checked out ____
No, Library does not own the book(s) ____
No, (specify) ____

18. IF YOU DID NOT GET THE BOOK(S) YOU WANTED, PLEASE TELL WHAT KIND:
(A) NON-FICTION: (Give title, author, subject, or catalog number if possible.)

____

(B) FICTION: Novel ___ Mystery ___ Science Fiction ___ Western ___ Other ____
(Give specific author and title, if possible.)

____

19. IF YOU HAVE ANY COMMENTS OR SUGGESTIONS YOU WOULD LIKE TO MAKE TO THE LIBRARY, PLEASE PUT THEM ON THE BACK OF THIS FORM.

APPENDIX Ib

When you finish this book, please fill in the information requested below and attach this slip to the borrower survey form.

(1) If this is an adult book with a number on the spine, please write the number here: _____

(2) If the book does not have a number (or is a children's or Y.A. book), please check what kind it is from this list:

Adult Novel ___ Adult Western ___
Adult Sci.Fic. ___ Adult Mystery ___
Child or Y.A. book ___ Other _____

(3) Did you use this book mainly for:

Recreational reading _____
School reading _____
Work related reading _____
General Information _____
Other (specify) _____
_____
_____

(4) How many people read this book between borrowing and return?

_____

(5) Did you read:

The whole book _____
More than half _____
Less than half _____
Just a few pages _____
None of it _____

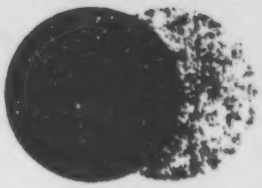
(6) Please write the date this book was:

Borrowed from the Library _____
_____
Returned to the Library _____
_____

(7) Do you intend to renew this book

_____ Yes _____ No

APPENDIX Ic



FORT WORTH PUBLIC LIBRARY
Ninth and Throckmorton • Fort Worth, Texas • 76102
817-335-4781

Dear Library Patron,

We at the Fort Worth Public Library are constantly trying to improve our services to you. We could make improvements simply by spending more money, but in times like these (indeed at any time) that solution would be irresponsible.

Since it is you we are serving, and your tax dollars we are spending to do so, we think the best way to improve service without spending more money is to ask you, the Library User, what kinds of library materials and services you want.

The attached questionnaire is designed to help us find out what kinds of books you use and want. We won't know what you want unless you fill it out and return it to the Library. We have kept the questionnaire as short as possible to save you time (it should take about 10-15 minutes), and you can do it at home. Here are the instructions:

> Fill out the long form attached to this letter at your convenience. As you finish each book you borrowed, fill out the small question slip which came with it. Please fill out the slips for all the books, even those you do not read at all. Attach the small slips securely to the long form (with a staple, paper clip, etc. or put them all in an envelope). Return the questionnaires to the Library when you return your books. Be sure to use and return the books as you normally would; do not hold them longer or shorter than you would any other time. If you have any comments or suggestions you would like to make about Library service, please write them on the back of the questionnaire. If you have any questions about the survey, please call the Library.

Thank you for taking the time to participate in this survey. Your answers will be very helpful. This information will be strictly confidential and will be used for library purposes only.

As a tangible thank-you for participating in our survey, we want to give you three (3) free book reserves (the usual charge is 25 cents per reserve). To obtain these reserves, simply present this letter at the Return Desk of any Fort Worth Public Library when you return your questionnaire. The reserves can be used at any time. Once again, Thank You!

APPENDIX II

SUMMARY OF DATA FROM FWPL BORROWER SURVEYS AT THE CENTRAL LIBRARY AND SOUTHWEST BRANCH DURING FALL 1976 AND SPRING 1977

Ref.	Item or Question	Cent. Fall '76	SW Fall '76	Cent.Sp. '77	SW Sp. '77
1	Number of questionnaires distributed during the survey period.	338	251	246	57
2	Number of usable questionnaires returned.	74	115	164	26
3	Usable forms as a percent of the total distributed.	21.6%	45.8%	66.6%	45.6%
4	Total borrowed books represented by the usable questionnaires	183	346	374	113
5	Mean books per borrower.	2.5	3.0	2.3	4.3

APPENDIX II - CONTINUED

Ref.	Item or Question	Cent. Fall '76	SW Fall '76	Cent.Sp. '77	SW Sp. '77
6	Total book circulation during sample period. (Because Spring sample was done as books were returned, the applicable circulation period was that beginning three weeks prior to actual sampling and was so calculated.)	3663	4593	3432	4597
7	Sampled books as a percent of the total circulation during the sample period.	5.0%	7.5%	10.9%	2.5%
8	Mean number of days sampled books were borrowed.	15.8	16.5	18.8	19.1
9	Sex: Male	48(65.0%)	25(21.7%)	91(55.5%)	8(30.8%)
	Female	26(35.0%)	88(76.5%)	70(42.7%)	18(69.2%)
	No response	0	2(1.7%)	3(1.8%)	0
	Total	74(100.0%)	115(99.9%)	164(100.0%)	26(100.0%)

APPENDIX II - CONTINUED

Ref.	Item or Question	Cent. Fall '76	SW Fall '76	Cent.Spr. '77	SW Sp. '77
10	Married	48(65.0%)	95(82.6%)	81(49.4%)	14(53.9%)
	Single	26(35.0%)	16(13.9%)	75(45.7%)	12(46.2%)
	No response	0	4(3.5%)	8(4.9%)	0
	Total	74(100.0%)	115(100.0%)	164(100.0%)	26(100.1%)
11	Mean number of persons in the household:				
	Adults	1.97	2.40	2.28	2.10
	Children under 15	0.55	0.80	0.73	1.27
12	Age of respondents in years:				
	Mean	40.87	44.11	32.32	35.72
	Median	37	43	29	35
	Mode	28(6)	43&52(5)	28(12)	17(3)

APPENDIX II - CONTINUED

Ref.	Item or Question	Cent. Fall '76	SW Fall '76	Cent. Sp. '77	SW Sp. '77
13	Race: Black	4(5.4%)	0	16(9.8%)	0
	White	67(90.5%)	115(100.0%)	131(79.9%)	26(100.0%)
	Mexican-Amer.	2(2.7%)	0	11(6.7%)	0
	Other	0	0	3(1.8%)	0
	No response	1(1.4%)	0	3(1.8%)	0
	Total	74(100.0%)	115(100.0%)	164(100.0%)	26(100.0%)
14	Highest level of education attained:				
	6th grade or less	0	1(0.9%)	1(0.6%)	0
	7th-12th grade	11(14.9%)	3(2.6%)	28(17.1%)	7(26.9%)
	High school grad.	10(13.5%)	23(20.0%)	19(11.6%)	4(15.4%)
	1-4 yrs. college	21(28.4%)	35(30.4%)	50(30.5%)	6(23.1%)
	College graduate	16(21.6%)	38(33.0%)	39(23.9%)	7(26.9%)

APPENDIX II - CONTINUED

Ref.	Item or Question	Cent. Fall '76	SW Fall '76	Cent. Sp. '77	SW Sp. '77
14	Highest level of education attained (continued):				
	Post graduate	16(21.6%)	12(10.4%)	24(14.6%)	2(7.7%)
	No response	0	3(2.6%)	3(1.8%)	0
	Total	74(100.0%)	115(99.9%)	164(100.1%)	26(100.0%)
15	Are you currently a student (either full or part-time)?				
	Yes	20(27.0%)	12(10.4%)	43(26.2%)	9(34.6%)
	No	40(54.1%)	77(67.0%)	88(53.7%)	12(46.2%)
	No response	14(18.9%)	26(22.6%)	33(20.1%)	5(19.2%)
	Total	74(100.0%)	115(100.0%)	164(100.0%)	26(100.0%)
16	Approximate annual income of respondent's family:				
	Mean	$16,700	$21,159	$17,300	$20,656
	Median	$15,000	$20,000	$15,000	$19,000
	Mode	$15,000	$20,000	$20,000 & $25,000	$30,000

APPENDIX II - CONTINUED

Ref.	Item or Question	Cent. Fall '76	SW Fall '76	Cent. Sp. '77	SW Sp. '77
17	Residence of respondents:				
	East Fort Worth	9(12.2%)	1(0.9%)	16(9.8%)	0
	North Fort Worth	6(8.1%)	0	8(4.9%)	0
	Northeast Ft.Worth	4(5.4%)	0	12(7.3%)	0
	Northwest Ft.Worth	0	0	0	0
	Downtown Ft.Worth	2(2.7%)	0	0	0
	South Fort Worth	11(14.9%)	11(9.6%)	30(18.3%)	5(19.2%)
	Southeast Ft.Worth	2(2.7%)	0	7(4.3%)	0
	Southwest Ft.Worth	6(8.1%)	97(84.3%)	19(11.6%)	19(73.1%)
	West Fort Worth	12(16.2%)	1(0.9%)	36(22.0%)	2(7.7%)
	Outside Ft.Worth in Tarrant County	20(27.0%)	1(0.9%)	24(14.6%)	0
	Outside Tarrant Cty.	1(1.4%)	2(1.7%)	10(6.1%)	0
	No response	1(1.4%)	2(1.7%)	2(1.2%)	0
	Total	74(100.0%)	115(100.0%)	164(100.1%)	26(100.0%)

APPENDIX II - CONTINUED

Ref.	Item or Question	Cent. Fall '76	SW Fall '76	Cent. Sp. '77	SW Sp. '77
18	Library usually used by respondents:				
	Central Library	67(90.5%)	0	136(82.9%)	0
	East Branch	1(1.4%)	0	2(1.2%)	0
	North Branch	2(2.7%)	0	0	0
	Northeast Branch	0	0	4(2.4%)	0
	Southwest Branch	1(1.4%)	111(96.5%)	6(3.7%)	25(96.2%)
	Southeast Branch	0	1(0.9%)	0	1(3.9%)
	South Branch	0	0	1(0.6%)	0
	West Branch	1(1.4%)	1(0.9%)	7(4.3%)	0
	Bookmobiles	0	0	0	0
	Non-Ft.Worth public library	1(1.4%)	0	6(3.7%)	0
	No response	1(1.4%)	2(1.7%)	2(1.2%)	0
	Total	74(100.2%)	115(100.0%)	164(100.0%)	26(100.1%)

APPENDIX II - CONTINUED

Ref.	Item or Question	Cent. Fall '76	SW Fall '76	Cent. Sp. '77	SW Sp. '77
19	Usual transportation to library:				
	Family car	32(43.2%)	107(93.0%)	88(53.7%)	23(88.5%)
	Other car	3(4.1%)	4(3.5%)	11(6.7%)	1(3.9%)
	Bus	10(13.5%)	0	19(11.6%)	0
	Walk	19(25.7%)	2(1.7%)	41(25.0%)	0
	Other	0	0	1(0.6%)	0
	No response	10(13.5%)	2(1.7%)	4(2.4%)	2(7.7%)
	Total	74(100.0%)	115(99.9%)	164(100.0%)	26(100.1%)
20	Library trips usually made from:				
	Home	30(40.5%)	107(93.0%)	83(50.6%)	20(76.9%)
	Work	33(44.6%)	2(1.7%)	65(39.6%)	2(7.7%)
	School	4(5.4%)	4(3.5%)	9(5.5%)	3(11.5%)

APPENDIX II - CONTINUED

Ref.	Item or Question	Cent. Fall '76	SW Fall '76	Cent. Sp. '77	SW Sp. '77
20	Library trips usually made from(cont.):				
	Other	1(1.4%)	0	0	0
	No response	6(8.1%)	2(1.7%)	7(4.3%)	1(3.9%)
	Total	74(100.0%)	115(99.9%)	164(100.0%)	26(100.0%)
21	Travel time to library:				
	Less than 5 min.	27(36.5%)	52(45.2%)	55(33.5%)	13(50.0%)
	5-15 minutes	26(35.1%)	54(47.0%)	71(43.3%)	10(38.5%)
	16-30 minutes	15(20.3%)	5(4.3%)	23(14.0%)	1(3.9%)
	31-45 minutes	4(5.4%)	1(0.9%)	6(3.7%)	1(3.9%)
	46-60 minutes	1(1.4%)	1(0.9%)	1(0.6%)	0
	Over 60 minutes	0	0	1(0.6%)	0
	No response	1(1.4%)	2(1.7%)	7(4.3%)	1(3.9%)
	Total	74(100.1%)	115(100.0%)	164(100.1%)	26(100.2%)

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APPENDIX II - CONTINUED

Ref.	Item or Question	Cent. Fall '76	SW Fall '76	Cent. Sp. '77	SW Sp. '77
22	Frequency of visiting library:				
	Everyday	0	0	3(1.8%)	0
	Several days a week	11(14.9%)	8(7.0%)	30(18.3%)	2(7.7%)
	Once a week	9(12.2%)	29(25.2%)	28(17.1%)	4(15.4%)
	Several days a month	29(39.2%)	37(32.2%)	51(31.1%)	13(50.0%)
	Every 3 weeks	12(16.2%)	28(24.3%)	19(11.6%)	6(23.1%)
	Several days a yr.	10(13.5%)	8(7.0%)	25(15.2%)	1(3.9%)
	Once a year or less	1(1.4%)	1(0.9%)	3(1.8%)	0
	Other	2(2.7%)	2(1.7%)	1(0.6%)	0
	No response	0	2(1.7%)	4(2.4%)	0
	Total	74(100.1%)	115(100.0%)	164(99.9%)	26(100.1%)
23	Method(s) of finding books in the library:				
	Used card catalog	18[19](32.7%)	12[24](21.6%)	59[31](41.9%)	5[8](35.1%)
	Asked Librarian	4[7](9.7%)	1[10](6.6%)	15[20](16.3%)	2[2](10.8%)

APPENDIX II - CONTINUED

Ref.	Item or Question	Cent. Fall '76	SW Fall '76	Cent. Sp. '77	SW Sp. '77
23	Continued Knew where to look on shelves	19[20](34.5%)	36[33](41.3%)	26[23](22.8%)	4[6](27.0%)
	Browsed	7[18](22.1%)	15[30](26.9%)	23[14](17.2%)	4[6](27.0%)
	Other	[1](0.9%)	4[2](3.6%)	2[1](1.4%)	0
	No response	0	0	1 (0.6%)	0
	Total	48[65](99.9%)	68[99](100.0%)	126[89](100.2%)	15[22](99.9%)
(NOTE: First figure is for number of single responses; bracketed figure is for multiple responses. Percentages are of total for both types.)					
24	On your last visit did you find the specific book(s) you wanted:				
	Yes	44 (57.1%)	70 (60.9%)	116 (69.0%)	17 (63.0%)
	No, book(s) was checked out	14[3](22.1%)	21[2](20.0%)	21[4](14.9%)	0[1](3.7%)

APPENDIX II - CONTINUED

Ref.	Item or Question	Cent. Fall '76	SW Fall '76	Cent. Sp. '77	SW Sp. '77
24	Continued				
	No, library does not own it	5[2](9.1%)	7[1](7.0%)	6[4](6.0%)	4[1](18.5%)
	No, (other)	7[1](10.4%)	10[2](10.4%)	6 (3.6%)	1 (3.7%)
	No response	1 (1.3%)	2 (1.7%)	11 (6.5%)	3 (11.1%)
	Total	71[6](100.0%)	110[5](100.0%)	160[8](100.0%)	25[2](100.0%)
(NOTE: First figure is for single responses; bracketed figures are for multiple responses. Percentages are of total for both types.					
25	Type of book desired but not found on previous visit:				
	Non-Fiction	22(29.7%)	16(13.9%)	32(19.5%)	4(15.4%)
	Fiction: Novel	5(6.8%)	18(15.7%)	8(4.9%)	4(15.4%)
	Mystery	0	6(5.2%)	3(1.8%)	2(7.7%)
	Sci.Fic.	1(1.4%)	1(0.9%)	1(0.6%)	1(3.8%)

APPENDIX II - CONTINUED

Ref.	Item or Question	Cent. Fall '76	SW Fall '76	Cent. Sp. '77	SW Sp. '77
25	Continued				
	Western	0	0	1(0.6%)	0
	Other	0	2(1.7%)	5(3.0%)	0
	No response	46(62.2%)	72(62.6%)	114(69.5%)	15(57.7%)
	Total	74(100.1%)	115(100.0%)	164(99.9%)	26(100.0%)
26	Type of book borrowed by respondent:				
	Non-Fiction	135(73.8%)	146(42.2%)	269(71.9%)	50(44.2%)
	Fiction: Novel	26(14.2%)	120(34.7%)	30(8.0%)	22(19.5%)
	Sci.Fic.	4(2.2%)	7(2.0%)	2(0.5%)	1(0.9%)
	Child or Y.A	0	10(2.9%)	27(7.2%)	18(15.9%)
	Western	1(0.5%)	5(1.4%)	0	1(0.9%)
	Mystery	9(4.9%)	53(15.3%)	31(8.3%)	14(12.4%)
	Other	6(3.3%)	5(1.4%)	12(3.2%)	7(6.2%)
	Sub-total Fiction	46(25.1%)	200(57.8%)	102(27.3%)	63(55.8%)
	Blank	2(1.1%)	0	3(0.8%)	0
	Total	183(100.0%)	346(100.0%)	374(100.0%)	113(100.0%)

APPENDIX II - CONTINUED

Ref.	Item or Question	Cent. Fall '76	SW Fall '76	Cent. Sp. '77	SW Sp. '77
27	Purpose for which book was borrowed:				
	Recreational reading	79(43.2%)	235(67.9%)	170(45.5%)	70(61.9%)
	School related reading	25(13.7%)	12(3.5%)	82(21.9%)	18(15.9%)
	Work related reading	26(14.2%)	11(3.2%)	30(8.0%)	12(10.6%)
	General Infor.	39(21.3%)	71(20.5%)	66(17.6%)	12(10.6%)
	Other	13(7.1%)	16(4.6%)	26(7.0%)	1(0.9%)
	No response	1(0.6%)	1(0.3%)	0	0
	Total	183(100.1%)	346(100.0%)	374(100.0%)	113(99.9%)
28	Number of people who read the books borrowed by the respondents:				
	Mean	1.10	1.13	1.39	1.23
	Mode	1	1	1	1

APPENDIX II - CONTINUED

Ref.	Item or Question	Cent. Fall '76	SW Fall '76	Cent. Sp. '77	SW Sp. '77
29	Portion of book read:				
	Whole book	101(55.2%)	210(60.7%)	183(48.9%)	90(79.7%)
	More than half	32(17.5%)	30(8.7%)	69(18.4%)	12(10.6%)
	Less than half	15(8.2%)	45(13.0%)	69(18.4%)	7(6.2%)
	Only a few pages	31(16.9%)	47(13.6%)	38(10.2%)	4(3.5%)
	None	2(1.1%)	14(4.0%)	12(3.2%)	0
	No response	2(1.1%)	0	3(0.8%)	0
	Total	183(100.1%)	346(100.0%)	374(99.9%)	113(100.0%)
30	Number of days books were retained by respondents:				
	Total	2,345	5,177	5,271	2,098
	No response	35	31	95	3
	Mean	15.8	16.5	18.9	19.1

APPENDIX II- CONTINUED

Ref.	Item or Question	Cent. Fall '76	SW Fall '76	Cent. Sp. '77	SW Sp. '77
31	Does respondent intend to renew the book?				
	Yes	18(9.8%)	26(7.5%)	71(19.0%)	9(8.0%)
	No	149(81.4%)	310(89.6%)	293(78.3%)	103(91.2%)
	No response	16(8.7%)	10(2.9%)	10(2.7%)	1(0.9%)
	Total	183(99.9%)	346(100.0%)	374(100.0%)	113(100.1%)

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